

## WHAT IS CLAIMED IS:

1           1. A system for transferring a known infinity  
2 homography, comprising:

3               an image processor processing an image sequence,  
4 wherein the image processor:

5                   selects an image pair from the image  
6 sequence, the selected image pair including one of two  
7 images to which the known infinity homography applies  
8 and an additional image; and

9                   derives an infinity homography for the  
10 selected image pair from the known infinity  
11 homography.

1           2. The system according to claim 1, wherein the  
2 image processor, in deriving the infinity homography for  
3 the selected image pair, determines intermediate transfer  
4 parameters for a homography for the selected image pair.

1           3. The system according to claim 2, wherein the  
2 image processor determines a scalar multiple for the  
3 homography for the selected image pair and a vector  
4 multiple of epipoles for the selected image pair.

1           4. The system according to claim 1, wherein the  
2 additional image is sequential within the image sequence to  
3 one of the two images to which the known infinity  
4 homography applies.

1           5. The system according to claim 1, wherein the two  
2 images to which the known infinity homography applies are  
3 consecutive images within the image sequence.

1           6. The system according to claim 1, wherein the two  
2 images to which the known infinity homography applies are  
3 consecutive images  $i, j$  within the image sequence, the  
4 additional image is image  $k$  consecutive with images  $i, j$   
5 within the image sequence, wherein the image processor  
6 solves  $c_{jk} [e_{ik}]_x H_{jk} + [e_{ik}]_x e_{jk} z_{jk}^T = c_{ik} F_{ik} H_{ij\infty}^{-1}$ , where  $H_{jk}$  is a homography  
7 for images  $j, k$ ,  $c_{jk}$  is a scalar multiple for the homography  
8  $H_{jk}$ ,  $e_{jk}$  are epipoles for images  $j, k$ ,  $z_{jk}^T$  is a transpose of  
9 an unknown vector multiple for the epipoles  $e_{jk}$ ,  $[e_{ik}]_x$  is  
10 derived from the epipoles  $e_{ik}$  for images  $i, k$ ,  $c_{ik}$  is a scalar  
11 multiple for a homography  $H_{ik}$  for images  $i, k$ ,  $F_{ik}$  is a  
12 fundamental matrix for images  $i, k$ , and  $H_{ij\infty}^{-1}$  is an inverse of  
13 the known infinity homography.

1           7. The system according to claim 1, wherein the  
2   known infinity homography relates image points for the  
3   second image within the image sequence to image points for  
4   the first image within the image sequence.

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1           8. A system for processing an image sequence,  
2 comprising:

3           a video system including an input for receiving  
4 the image sequence; and

5           an image processor within the video system  
6 processing the image sequence, wherein the image processor:

7           selects an image pair from the image  
8 sequence, the selected image pair including one of two  
9 images to which a known infinity homography applies  
10 and an additional image; and

11           derives an infinity homography for the  
12 selected image pair from the known infinity  
13 homography.

14           9. The system according to claim 8, wherein the  
15 image processor, in deriving the infinity homography for  
16 the selected image pair, determines intermediate transfer  
17 parameters for a homography for the selected image pair.

18           10. The system according to claim 9, wherein the  
19 image processor determines a scalar multiple for the  
20 homography for the selected image pair and a vector  
21 multiple for epipoles for the selected image pair.

11. The system according to claim 8, wherein the additional image is sequential within the image sequence to one of the two images to which the known infinity homography applies.

12. The system according to claim 8, wherein the two images to which the known infinity homography applies are consecutive images within the image sequence.

13. The system according to claim 8, wherein the two images to which the known infinity homography applies are consecutive images  $i, j$  within the image sequence, the additional image is image  $k$  consecutive with images  $i, j$  within the image sequence, wherein the image processor solves  $c_{jk} [e_{ik}]_x H_{jk} + [e_{ik}]_x e_{jk} z_{jk}^T = c_{ik} F_{ik} H_{ij\infty}^{-1}$ , where  $H_{jk}$  is a homography for images  $j, k$ ,  $c_{jk}$  is a scalar multiple for the homography  $H_{jk}$ ,  $e_{jk}$  are epipoles for images  $j, k$ ,  $z_{jk}^T$  is a transpose of an unknown vector vector multiple for the epipoles  $e_{jk}$ ,  $[e_{ik}]_x$  is derived from the epipoles  $e_{ik}$  for images  $i, k$ ,  $c_{ik}$  is a scalar multiple for a homography  $H_{ik}$  for images  $i, k$ ,  $F_{ik}$  is a fundamental matrix for images  $i, k$ , and  $H_{ij\infty}^{-1}$  is an inverse of the known infinity homography.

1           14. The system according to claim 8, wherein the  
2 known infinity homography relates image points for the  
3 second image within the image sequence to image points for  
4 the first image within the image sequence.

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1           15. A method for transferring a known infinity  
2 homography for two images within an image sequence to other  
3 image pairs within the image sequence, comprising:

4           selecting an image pair from the image sequence,  
5 the selected image pair including one of the two images to  
6 which the known infinity homography applies and an  
7 additional image; and

8           deriving an infinity homography for the selected  
9 image pair from the known infinity homography.

10           16. The method according to claim 15, wherein the  
11 step of deriving an infinity homography for the selected  
12 image pair from the known infinity homography further  
13 comprises:

14           determining intermediate transfer parameters for  
15 a homography for the selected image pair.

16           17. The method according to claim 16, wherein the  
17 step of determining intermediate transfer parameters for a  
18 homography for the selected image pair further comprises:

19           determining a scalar multiple for the homography  
20 for the selected image pair and a vector multiple for  
21 epipoles for the selected image pair.

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20. The method according to claim 15, wherein the two images to which the known infinity homography applies are consecutive images  $i, j$  within the image sequence, the additional image is image  $k$  consecutive with images  $i, j$  within the image sequence, and wherein the step of deriving an infinity homography for the selected image pair from the known infinity homography further comprises:

solving  $c_{jk} [e_{ik}]_x H_{jk} + [e_{ik}]_x e_{jk} z_{jk}^T = c_{ik} F_{ik} H_{ij\infty}^{-1}$ , where  $H_{jk}$  is a homography for images  $j, k$ ,  $c_{jk}$  is a scalar multiple for the homography  $H_{jk}$ ,  $e_{jk}$  are epipoles for images  $j, k$ ,  $z_{jk}^T$  is a transpose of an unknown vector multiple for the epipoles  $e_{jk}$ ,  $[e_{ik}]_x$  is derived from the epipoles  $e_{ik}$  for images  $i, k$ ,  $c_{ik}$  is a scalar multiple for a homography  $H_{ik}$  for images  $i, k$ ,  $F_{ik}$  is a fundamental matrix for images  $i, k$ , and  $H_{ij\infty}^{-1}$  is an inverse of the known infinity homography.